Extremes of mean temperature for periods of 12 consecutive months at representative Alaskan stations and at Seattle, Wash., and Bismarck, N. Dak.

Stations	Years of record	Normal	Coldest 12-month period: Date	Mean	Departure from normal	Warmest 12-month period: Date	Mean	Departure from normal
		°F.		°F.			°F.	
Eagle	17	23.8	July, 1917-June, 1918	18.2	−5.6	October, 1914-September, 1915.	30.2	+6.4
Fairbanks	18	25.5	July, 1917-June, 1918	21.1	−4.4	do	31.0	+5.5
Nome	17	25.2	January, 1920-December, 1920.	21.2	−4.0	January, 1912-December, 1912.	29.5	+4.3
Sitka	24	43.7	October, 1903-September, 1904.	41.3	−2.4	October, 1914-September, 1915.	47.4	+3.7
Fortmann Hatchery.	19	42.8	January, 1909-December, 1909.	38.9	−3.9	January, 1915-December, 1915.	46.6	+3.8
Seattle	32	51.3	January, 1916-December, 1916.	49.2	−2.1	January, 1892-December, 1892.	53.8	+2.5
Bismarck	49	40.5	December, 1874-November, 1875.	35.3	−5.2	December, 1877-November, 1878.	46.3	+5.8

Extremes of precipitation totals for periods of 12 consecutive months at representative Alaskan stations and at Seattle, Wash., and Bismarck, N. Dak.

Stations	Years of record	Normal	Wettest 12-month period: Date	Total	Per cent of normal	Driest 12-month period: Date	Total	Per cent of normal
		Ins.		Ins.			Ins.	
Eagle	17	9.87	July, 1910-June, 1911	15.13	153	March, 1920-February, 1921.	6.22	63
Fairbanks.	18	11.88	November, 1906-October, 1907.	23.59	197	April, 1908-March, 1909.	7.28	61
Nome	17	17.37	December, 1921-November, 1922.	31.14	179	September, 1908-August, 1909.	7.33	42
Sitka	24	84.08	February, 1918-January, 1919.	107.58	128	October, 1902-September, 1903.	59.58	71
Fortmann Hatchery.	19	148.06	November, 1905-October, 1906.	188.88	128	June, 1919-May, 1920	107.05	72
Seattle	32	33.43	April, 1893-March, 1894.	48.39	145	December, 1910-November, 1911.	21.01	63
Bismarck	49	16.99	February, 1876-January, 1877.	31.78	187	June, 1889-July, 1890	7.70	45

ON THE APPLICATION OF THE FRONTAL THEORY TO CYCLONES IN THE SAHARA

551.515(661)

By M. L. PETITJEAN

(Comptes Rendus, 179, No. 1, July 7, 1924, pp. 64-65)

[Translated by B. M. Varney, Weather Bureau]

The thermal discontinuity between winds of Mediterranean and of tropical origin in northern Africa reveals the existence, especially in the warmer months, of a special front,[1] which seems to be related to that of the Trade Winds.[2] It delimits the warm and the cold sectors of depressions, the centers of which, at the time of their appearance on the synoptic charts, occupy extreme sourthern Morocco, and the direction of movement of which is confined to either SW.-NE. or W.-E.

The warm sector is at first limited on its western side by the High Atlas of Morocco; it extends toward the north and follows in its course the Saharan chain of the Atlas. On the eastern side its boundary is prolonged as far as southern Tunis. The layer of southerly winds. * * * extends to a higher altitude the greater is the heating in the tropical regions. It rises above the winds from the sea [these constituting the cold sector of the cyclone.—*Ed.*], and its progress northward can be traced from one station by the gradual lowering of its under side, as shown by pilot balloon soundings at military meteorological stations in Algeria and the Sahara.

While maintaining itself in general parallel to the orientation of the Atlas, the front of discontinuity oscillates, with variable amplitude and variable period, as a result of the conflict between the tropical and Mediterranean winds. This is made clear by tracing the lines of synchronous rainfall in connection with the stormy periods which accompany the passage of depressions originating in the Sahara. These lines give way, sometimes toward the north and sometimes toward the south, depending on whether the energy of the tropical winds or that of the winds from the sea is predominant. These alternating advances and retreats are the cause of a succession of very characteristic squalls. When the cold winds finally become dominant they gradually displace the layer of warm winds. Cloudiness decreases continuously and slowly, for the slope of the surface of discontinuity is very slight (a few mm. only), whereupon fine weather succeeds the stormy period.

The topography of north Africa influences the position of the surface of discontinuity as long as that surface passes above the crest of the Atlas Range, the tropical winds rise freely along it. But when, by reason of its shift in position, it is cut by the opposing slope, a foehn effect is produced which gives rise on the opposite side [north side] to a violent sirocco. After having expanded adiabatically during its ascent, the air finds itself after descent at a higher temperature as the result of adiabatic heating due to compression, this heating acting in addition to the gain of heat induced by condensation of water vapor during the ascent.

North of the Atlas the warm air is again forced up, this time above the ocean winds. This double ascent is revealed by the isochrones of rain occurring on the two sides of the mountainous massif.

The warm sector of Saharan depressions usually remains open toward the south side, but it may, as is the case with depressions in the Temperate Zone, be "cut off," either as a result of the arrival of colder air at its rear or of the weakening of the tropical flow. A second depression is thus produced following the first and may in its turn be cut off. It is not rare to discover on the charts of the meteorological service of Algeria cyclone families made up of three of these depressions in a string, lying essentially parallel to the trend of the Atlas.

[1] Petitjean, L., Surfaces de discontinuité en Algerie et au Sahara. (Cahiers du Service Météorologique d'Algerie, 1923, No. 1, p. 13.)

[2] Bjerknes, V., On the dynamics of the circular vortex, with applications to the atmosphere and atmospheric vortex and wave motions. (Geofysiske Publikationer Kristiania, 2, No. 4, 1921, pp. 62-63.)

551.515(262.3)

SECONDARY DEPRESSIONS IN THE ADRIATIC SEA

By FILIPPO EREDIA

(Comptes Rendus, 179, No. 1, July 7, 1924, pp. 65, 67)

[Translated by B. M. Varney, Weather Bureau]

Sometimes, over the Adriatic appear barometric depressions which, as soon as they are formed, move rapidly in a direction from Northeast to southwest, gradually changing their course by turning toward the south when they reach Sicily or Tripoli. Rarely do they take a course toward the southeast, crossing the Ionian Sea to the Cyrenian Sea. These depressions, believed by most scientists to originate over the Tyrrhenian Sea, present very different characters from those of other depressions in the Mediterranean Basin.

The inception of these depressions is due to special conditions on the Adriatic slope. We may affirm these conditions to be, very limited thermal differences in comparison with those of adjoining regions, followed by decreases in pressure. In this case, under the influence of important depressions existing over northern Europe, there form on the Adriatic depressions which one may consider as secondaries.

If an anticyclone is present at the same time in north or northwest Europe, the depression develops more deeply and forms a growing cyclone. The gradients increased almost equally in the various sectors, and, coincident with an extension of the area of the cyclone, the pressure decreases, and the cyclone moves toward the east, while the anticyclone likewise shows a movement, but toward more southern latitudes.

However, if the western anticyclone, which we may assume to be well developed, influences the movement of these secondary depressions, the other anticyclone, which exists over the Levant, exerts an influence which is not less important. We may regard this anticyclone as an indefinite one, because it does not represent in general more than a zone of relatively high pressure as compared with that of adjacent regions.

The two currents of air, the one cold, the other warm, which, according to the theory of Bjerknes, are necessary to the formation of a depression, may be engendered by these two anticyclones, which lie, the one in northwestern, the other in southeastern Europe. [Details of depression of December 20 and 21, 1923.]

These depressions form preferably during the winter months and are entirely lacking in summer, for the distribution of air temperature at that season facilitates their formation in the valley of the Po.

Thus, the conditions favorable to the formation of these secondary depressions would be the following: A very marked cyclone over northern Russia, and two areas of high pressure extending, the one over the British Isles, the other over the Levantine Sea [eastern Mediterranean]. The depressions, as soon as they are formed, move as a function of the movement which the anticyclones undergo. The anticyclone dominant in the Levantine Sea thus exercises the major influence.

NOTES ON THE WEST INDIAN HURRICANE OF OCTOBER 14-23, 1924

By CHARLES L. MITCHELL

[United States Weather Bureau, Washington, D. C.]

Recent reports indicate that the hurricane of October 14–23, 1924, was one of great intensity. Dr. José C. Millas, director, Observatorio Nacional, Habana, Cuba, writes: "I believe that this hurricane is one of the most severe ever experienced in our latitudes." Doctor Millas has forwarded a number of photographs clipped from El Mundo, Habana, taken in Los Arroyos and Arroyos de Mantua, Pinar del Rio Province, which suggest that the force of the wind was almost comparable to that in a tornado. The steel wireless tower at La Fe was blown down.

It is, indeed, fortunate that this hurricane passed over no land areas other than the extreme western end of Cuba and a very sparsely settled region in southern Florida. Full details of damage done by it have not been received from western Cuba. Press reports indicate that in Arroyos de Mantua about a dozen persons were killed and 50 injured and that almost every building in the town sustained heavy damage, besides the severe damage done to the tobacco crop. A maximum wind velocity of 72 miles an hour from the south was registered at Habana at 10 p. m. of the 19th, although the barometer fell little, if any, below 29.50 inches. The lowest pressures observed at a number of stations in western Cuba and also very complete barometric data from the S. S. *Toledo*, all kindly furnished by Dr. Millas, are given below:

CUBAN STATIONS, OCTOBER 19, 1924

	Inches
Guane	28.97
Dimas	28.54
La Fe	28.35
Pinar del Rio	29.28
Mantua	28.15
Los Arroyos	27.52

S. S. "TOLEDO" NEAR JUTIAS CAY (OFF THE NORTHWESTERN COAST)

Time, Oct. 19	Wind direction	Wind force	Pressure
			Inches
Noon	E. by N	11	29.18
1:00 p. m	E. by N	12	28.78
2:00 p. m	East		
	ESE	12	28.06
2:10 p. m	ESE	12	27.87
2:15 p. m	ESE	12	27.72
2:25 p. m	ESE	12	27.59
2:33 p. m	ESE	12	27.48
2:40 p. m	SE	12	27.44
2:50 p. m	SE	12	27.36
3:00 p. m	SE	12	27.28
3:15 p. m	SE	12	27.26
3:30 p. m	SSW	6	27.22
	WSW	8	
3:55 p. m	SSW	12	27.26
4:10 p. m	WSW	12	27.28
4:20 p. m	West	12	27.40
4:30 p. m	WNW	12	27.52
4:50 p. m	WNW	12	27.87
5:00 p. m	WNW	12	28.11
5:20 p. m	WNW	12	28.39
5:30 p. m	WNW	12	28.54
6:00 p. m	WNW	12	28.80
7:00 p. m	WNW	12	29.11
7:30 p. m	WNW	11	29.19
8:00 p. m	WNW	11	29.25
9:00 p. m	WNW	11	29.33

The following extracts are from a report of an interview that the meteorologist of the Panama Canal Zone had with Captain Burmeister, master of the United Fruit Steam Ship *Heredia*:

* * * At about 7 p. m. (October 18) all three ships (the *San Bruno*, *Turrialba*, and *Heredia*) left Havana Harbor and preceded toward Cape San Antonio. At first there was practically no wind, but as they steamed west the wind went around to east and northeast and gradually freshened up. There was a fairly heavy following sea. The wind gradually became heavier and the sea higher. At about 3 a. m. (October 19) the master of the *San Bruno* * * * decided that the center (of the storm) was to the westward and he radioed the other ships that he was going to turn around and steam toward the northeast. After debating at some length, Captain Burmeister also decided to turn around. At this time the ships position was about 23° 50′ N. and 84° 10′ W. The ship was headed north-northeast for a while and then north. The pressure dropped steadily. At 4 a. m. the barometer read 29.56 inches and the wind northeast force 4. At 6 a. m. the sea was so high that the captain decided to heave to. A message to that effect was sent to the two other ships. At 8 a. m. the pressure was 29.44 and the wind had risen to northeast 8. The ship was empty and it bobbed around like a cork. At 11 a. m. the pressure was 29.15 and the wind northeast 11. * * * At noon the barometer read 28.10 inches. This was a drop of 1.05 inches in one hour. At that hour the wind was blowing from the northeast force 12. The following is a vivid description of the storm at its height by Captain Burmeister:

"The whole sea was a boiling, seething mass. It was impossible to see any distance. It appeared as if the surface were covered with a mass of turbulent steam. The sea was breaking in such manner that it was impossible to tell whether the water in the air was rain or sea water. I estimated the wind to be blowing 120 m. p. h. I ordered every pound of steam to be used in keeping her under control."